UNIVERSITY OF SWAZILAND

FACULTY OF COMMERCE

DEPARMENT OF BUSINESS ADMINISTRATION

MAIN EXAMINATION PAPER; F/T STUDENTS

MAY 2014

TITLE OF PAPER : MANAGEMENT SCIENCE 11

COURSE CODE : BA 310

TIME ALLOCATED : THREE [3] HOURS

TOTAL MARKS : 100 MARKS

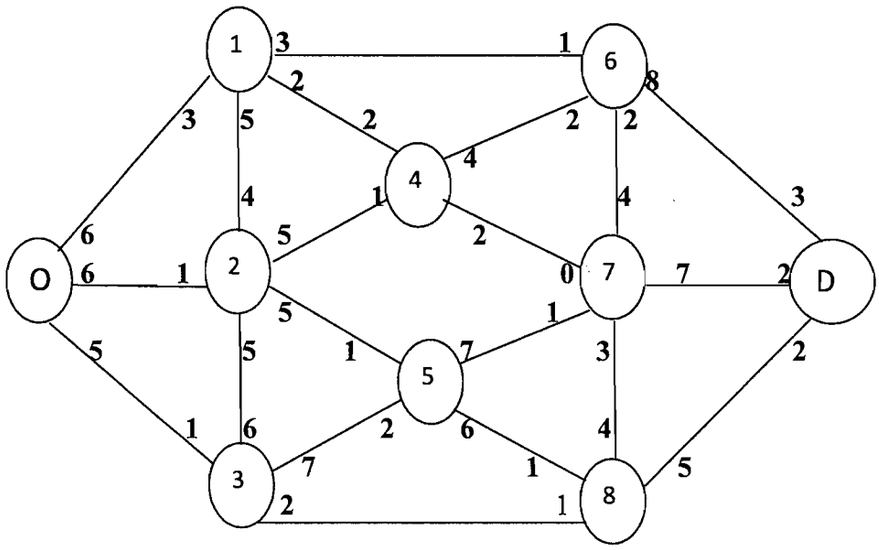
INSTRUCTIONS

1. TOTAL NUMBER OF QUESTIONS IN THIS PAPER IS 4
2. THE PAPER CONSISTS OF SECTION A AND SECTION B
3. ANSWER THE ALL QUESTIONS IN SECTION A AND ANY TWO [2] QUESTIONS IN SECTION B.
4. THE MARKS ALLOCATED FOR A QUESTION/PART OF A QUESTION ARE INDICATED AT THE END OF EACH QUESTION/PART OF QUESTION.
5. NOTE: MAXIMUM MARKS WILL BE AWARDED FOR QUALITY, LAYOUT, ACCURACY, AND GOOD PRESENTATION OF WORK.

THIS PAPER MUST NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

QUESTION 1:

1.1.A road network system around a Durban hotel is shown in the diagram below. The numbers by the nodes represent the traffic flow in hundreds of cars per hour. What is the maximum flow of cars from node O to node D? **(15 marks)**



1.2.The UNISWA Faculty of Commerce is intending to introduce new programs including MBA, and PhD. The Dean is scheduling lecturers to teach courses during the coming semester. Four core courses need to be covered. The four courses are at under graduate (UG), Master of Business Administration (MBA), Master of Management Sciences (MMS), and Doctor of Philosophy (PhD).Four lecturers will be assigned the courses with each lecturer receiving one of the courses.

Student evaluations of lecturers are available from previous semesters. Based on a rating scale of 4(excellent), 3(very good), 2(good), 1(fair) and 0 (poor), the average student evaluation for each lecturer are shown below.Lecturer D does not have a PhD and cannot be assigned to teach the PhD level course. If the Dean makes the teaching assignments based on maximizing the student evaluation ratings over all the four courses what staffing assignments should she make?

(20 marks)

LECTURER	COURSE			
	UG.	MBA	MMS	PhD
A	2.8	2.2	3.3	3.0
B	3.2	3.0	3.6	3.6
C	3.3	3.2	3.5	3.5
D	3.2	2.8	2.5	---

1.3. The Swaziland Modern Construction Company Corporation(SMCCO) ships pine flooring to three building supply houses from its mills in Madlangempisi (Mill 1),Lobamba(Mill 2), and Tinkhundla (Mill 3).Determine the optimal transportation schedule and to indicate the number of units that must be shipped from a source of supply(mill) to a supply house.Use the Northwest corner method in conjunction with the stepping stone method.Figures in the cells represent transportation rates from one mill to the three supply houses.

Transportation tableau for SMCCO

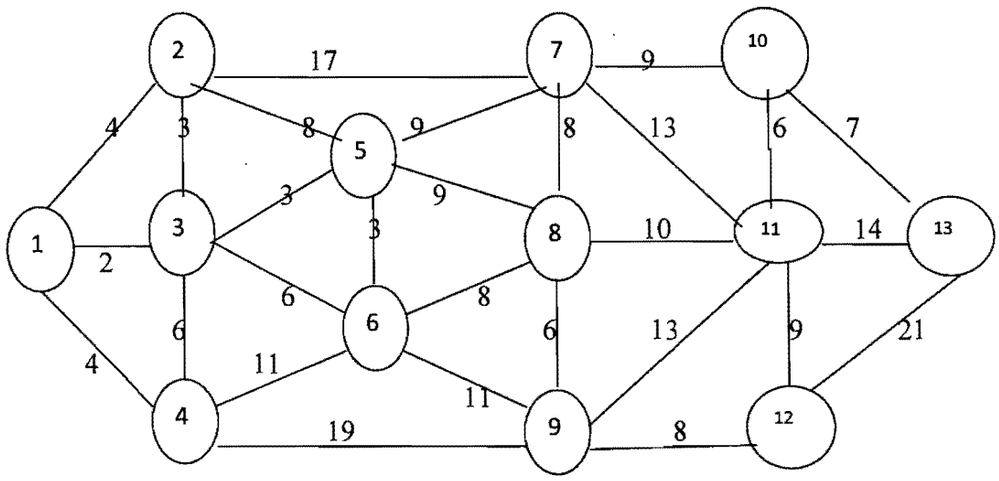
To / From	Supply House 1	Supply House 2	Supply House 3	Supply Capacity (Tons)
Mill(A)	E3	E3	E2	25
Mill(B)	4	2	3	40
Mill(C)	3	2	3	30
Demand (Tons)	30	30	35	

(15 marks)
[Total 50 Marks]

SECTION B: ANSWER TWO QUESTIONS ONLY FROM THIS SECTION.ALL QUESTIONS ARE ALLOCATED EQUAL MARKS .

QUESTION 2:

2.1. An electricity company is in the process of installing power lines to a large housing development in Manzini. The company wants to minimize the total length of wire used which will also minimize the costs. The housing development is shown as a network in the following diagram. The distances between the houses are given in hundreds of metres. What do you recommend?(This is a minimal spanning tree problem) **(10 marks)**



2.2. Production capacities, demand requirements and shipping rates of a company are shown below.

Production capacities.

Plant	3 months capacity (tons)
1	5000
2	6000
3	2500

The firm distributes products through its regional distribution centers whose demand forecasts for three months are as follows;

Demand forecasts.

Distribution centre	Demand Forecast (units)
A	6000
B	4000
C	2000
D	1500

Transportation cost. [In hundreds per ton]

Plant	Destination			
	A	B	C	D
1	E3	E2	E7	E6
2	7	5	2	3
3	2	5	4	5

Use the VAM to determine the optimal feasible transportation cost for the company?
(15 marks)

[Total 25 Marks]

QUESTION 3.

A recently established entertainment company has engaged in a film/drama project. In its recent documentary planning workshop the project team came up with the following activities and the estimated durations for the activities in days.

ID	Activity Description	Estimated duration	Activity Predecessor
A	Get script approval	2	---------
B	Film scene 1	3	A
C	Film scene 2	1	A
D	Film scene 3	2	B
E	Film scene 4	4	B
F	Film scene 5	2	B, C
G	Film scene 6	4	D, E
H	Cut & edit advert	5	F, G
I	Review with customer	1	H

i. Draw a network diagram with information about, ES, EF, LS, LF, of all the activities(use the AON method) (9 marks)
ii. Select one node and explain the four elements of the node (4 marks)
iii. Show duration for the different routes in your network diagram (8 marks)
iv. What is the project's critical path? (2 marks)
v. What is the project's completion time? (2 marks)

[Total 25marks]

QUESTION 4.

4.1.The management of a company is considering the introduction of a new product. The fixed cost to begin production of the new product is E30, 000.The variable cost for the product is expected to be between E16 and E24 with the most likely value of E20 per unit. The product will sell for E50 per unit. Demand for the product is expected to range from 300 to 2,100 units, with 1200 units the most likely demand.

Develop the profit model for this product and provide base case, worst case, and best case analysis. (10 marks)

4.2. Shiba Cooling Systems maintains a stock of 30 litre hot water heaters that it sells to home owners and installs for them. The owner of the company likes the idea of having a large supply on hand to meet customer demand, but he also recognizes that it is expensive to do so. He examines hot water heater sales over the past 50 weeks and notes the following:

HOT WATER HEATER SALES PER WEEK	NUMBER OF WEEKS THIS NUMBER WAS SOLD
4	6
5	5
6	9
7	12
8	8
9	7
10	3
	Total 50

a) If Air Cooling Systems maintains a constant supply of 8 hot water heaters in any given week, how many times will he be out of stock during a 20- week simulation? Use random numbers from the seventh column of the random number tables attached to the examination paper, beginning with the random digits 10 (10 marks)

b) What is the average number of sales per week (including stock outs) over the twenty week period? (5 marks)

[Total 25 Marks]

END OF EXAMINATION PAPER: GOOD LUCK!!!!!!

TABLE 15.5

Table of Random Numbers

52	06	50	88	53	30	10	47	99	37	66	91	35	32	00	84	57	07
37	63	28	02	74	35	24	03	29	60	74	85	90	73	59	55	17	60
82	57	68	28	05	94	03	11	27	79	90	87	92	41	09	25	36	77
69	02	36	49	71	99	32	10	75	21	95	90	94	38	97	71	72	49
98	94	90	36	06	78	23	67	89	85	29	21	25	73	69	34	85	76
96	52	62	87	49	56	59	23	78	71	72	90	57	01	98	57	31	95
33	69	27	21	11	60	95	89	68	48	17	89	34	09	93	50	44	51
50	33	50	95	13	44	34	62	64	39	55	29	30	64	49	44	30	16
88	32	18	50	62	57	34	56	62	31	15	40	90	34	51	95	26	14
90	30	36	24	69	82	51	74	30	35	36	85	01	55	92	64	09	85
50	48	61	18	85	23	08	54	17	12	80	69	24	84	92	16	49	59
27	88	21	62	69	64	48	31	12	73	02	68	00	16	16	46	13	85
45	14	46	32	13	49	66	62	74	41	86	98	92	98	84	54	33	40
81	02	01	78	82	74	97	37	45	31	94	99	42	49	27	64	89	42
66	83	14	74	27	76	03	33	11	97	59	81	72	00	64	61	13	52
74	05	81	82	93	09	96	33	52	78	13	06	28	30	94	23	37	39
30	34	87	01	74	11	46	82	59	94	25	34	32	23	17	01	58	73
59	55	72	33	62	13	74	68	22	44	42	09	32	46	71	79	45	89
67	09	80	98	99	25	77	50	03	32	36	63	65	75	94	19	95	88
60	77	46	63	71	69	44	22	03	85	14	48	69	13	30	50	33	24
60	08	19	29	36	72	30	27	50	64	85	72	75	29	87	05	75	01
80	45	86	99	02	34	87	08	86	84	49	76	24	08	01	86	29	11
53	84	49	63	26	65	72	84	85	63	26	02	75	26	92	62	40	67
69	84	12	94	51	36	17	02	15	29	16	52	56	43	26	22	08	62
37	77	13	10	02	18	31	19	32	85	31	94	81	43	31	58	33	51

Source: Excerpted from *A Million Random Digits with 100,000 Normal Deviates* (New York: Free Press, 1955) p. 7, with permission of the Rand Corporation.